Zero Retries issue 0132 2024-01-04

Zero Retries is an independent newsletter promoting technological innovation that is occurring in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Now in its third year of publication, with 1200+ subscribers.

About Zero Retries

Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor Emeritus

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Web version of this issue - https://www.zeroretries.org/p/zero-retries-0132

Request To Send

Commentary by Editor Steve Stroh N8GNJ

This is a rare issue of Zero Retries with a single, focused article. As you'll read, the subject matter is time sensitive, so I'm publishing this issue ahead of the usual publication day - *Friday 2024-01-05*.

I will publish the next issue of Zero Retries, with the usual Zero Retries content, as soon as possible after completing this issue - perhaps even at the usual 15:30 Pacific on Friday. But, with a lot of interesting content that surfaced in the past few weeks to integrate into that issue, I may give myself a bit of grace and publish the next issue with a minor delay.

Personal Comment / Observation - Light Commenting Expected

The unusual nature of the FCC's *Further* Notice of Proposed Rulemaking in Docket 16-239 seems to have mostly "flown under the RADAR" in US Amateur Radio. From my observations, that unusual nature combined with the cutoff date for comments falling so close to the Christmas / New Year holiday period, may… *probably will*… result in relatively few

comments on this matter. By now I would have expected many organizations to have filed comments, but (as I write this mid-day on Thursday) only two individuals - Ron Economos and Jeremy Taylor (*kudos to them!*) have filed comments the Further Notice of Proposed Rulemaking on FCC Docket 16-239.

Thus, every comment made will have outsized influence. Thus if you want to see Amateur Radio advance, ***please do comment!***

To see *current* comments on 16-239, go to https://www.fcc.gov/ecfs/search/search-filings,

- Proceedings blank: **16-239**
- Date Received Range **12/01/2023** (my suggestion)

73,

Steve N8GNJ

Leave a comment

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Image courtesy of the Federal Communications Commission (FCC)

Steve Stroh N8GNJ Comments to FCC Regarding FCC Docket 16-239 (Further Notice of Proposed Rulemaking)

I don't claim that the following is a "formal / traditional / expected" format for comments "submission" to the FCC. With only four days until cutoff of comments, the ARRL has not yet published a "template"[1] with a suggested format. Thus I'm creating this with the minimal guidance offered at the FCC's Electronic Comment Filing System / Submit a Standard Filing.

In the matter of: FCC Docket 16-239, Further Notice of Proposed Rulemaking

Comments of:
Steven K. Stroh
Amateur Radio callsign N8GNJ
P.O. Box 30725
Bellingham, Washington, 98228

Date: January 4, 2024

Abstract:

With the emergence of inexpensive, powerful, and abundant computing power and digital signal processing, and open source software technology (especially Software Defined Radio), Amateur Radio is ideal for experimentation with new radio technologies. Many radio technologies have been pioneered in the US, and have been developed by Amateur Radio such as Automatic Packet Reporting System (APRS) leading to Marine Automatic Identification System (AIS).

I posit that Amateur Radio regulations in the 2020s and beyond should be reconfigured to provide for maximum capability for experimentation and development of new technologies. Amateur Radio Operators have proven to be able to "work things out amongst ourselves" to accommodate legacy modes such as Morse Code (Continuous Wave or "CW") operations in the same bands as more advanced radio technologies such as high speed data communications.

Background:

I am an Amateur Radio Operator licensed since 1985. My primary interest / capabilities within Amateur Radio are operating with and experimenting with digital / data modes on the Amateur Radio VHF and UHF bands. I write a small weekly newsletter for Amateur Radio called Zero Retries where I discuss the amazing amount of technological innovation *that is occurring in Amateur Radio*.

Formal Comments

In reply to https://docs.fcc.gov/public/attachments/FCC-23-93A1.pdf
IV. FURTHER NOTICE OF PROPOSED, paragraph 22.:

(Excerpted and reformatted for easier commenting.)

FCC:
For the reasons outlined in the Report and Order adopted today, we tentatively conclude that we should eliminate the baud rate limitation in the 2200 meter and 630 meter bands as well as the VHF and UHF amateur radio bands. These bands present the same technological opportunities for experimentation and innovation as the amateur radio service bands that are the subject of the Report and Order and likewise will be limited if a baud rate limitation is allowed to remain for these bands.

Steven K. Stroh Comment:
I strongly agree removal of baud (symbol) rate limitations from all Amateur Radio bands. Such limitations no longer serve a useful purpose and restrict experimentation and innovation by Amateur Radio Operators in the Amateur Radio bands.

FCC:
Concomitantly, we seek comment on the appropriate bandwidth limitation for the 2200 meter band…

Steven K. Stroh Comment:
I recommend that there be no bandwidth limitation for the 2200 meter band.

The 2200 meter band is only 2.1 kHz and any bandwidth restriction for such a narrow band would stifle potential experimentation and innovation. I believe that Amateur Radio Operators can coordinate for effective, shared use of the 2200 meter band and that not having a bandwidth limitation will encourage experimentation, especially for digital / data modes.

FCC:
… and the 630 meter band…

Steven K. Stroh Comment:
I recommend that the 630 meter band should have the same 2.8 kHz bandwidth limitation as the FCC has recently implemented for other Amateur Radio High Frequency (HF) bands. This would allow for increased experimentation and innovation, especially for digital / data modes as will soon emerge on the other Amateur Radio HF bands.

FCC:
… as well as on maintaining the bandwidth limitations already in the VHF and UHF bands. We specifically seek comment on these proposals. Alternatively, should we consider changing any of the existing bandwidth limitations in the VHF and UHF bands allocated to the amateur radio service? Commenters seeking to modify existing bandwidth limitations must provide support for the modification, including any associated costs and benefits. Commenters should focus their comments on the VHF and UHF bands and the 2200 meter band and the 630 meter band that were allocated for amateur radio service after the release of the NPRM. We do not seek comment on other, unrelated issues in the docket at this time.

Steven K. Stroh Comment:

I recommend that all bandwidth limitations be removed for the Amateur Radio VHF and UHF bands. Doing so would allow for maximum potential for experimentation and innovation of new modes, especially digital / data modes, within Amateur Radio.

I recognize that this may appear counter-intuitive (no limits - at all???) and may be controversial, but I address the FCC's request for support, costs, and benefits justifications of my recommendation beginning in the next section of my comments.

Detail to Support Comments

On September 21, 1996, during a banquet speech at the ARRL and TAPR Digital Communications Conference (transcribed at https://www.zeroretries.org/p/zero-retries-0037), Lyle Johnson (then WA7GXD, now KK7P) offered this bit of distilled wisdom that, 27 years later, seems prescient and applicable to the FCC's request for comments in this docket:

My feeling of how Part 97 should read is easy — "Here's your band limits. Have a nice day." I think we could fit the whole of Part 97 on this side of this three by five card in large type. So that even a bifocal guy like me could read it without glasses.

In 1996, the potential of exponentially increasing computer power, for exponentially decreasing

prices, being applied to radio technology was beginning to be applied to Amateur Radio. That trend has only accelerated to my current observation:
”Radios Are Now Computers - With an Antenna”.

FCC Part 97.1 - Basis and Purpose (of the Amateur Radio Service) states:

(a) Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications.

(b) Continuation and extension of the amateur's proven ability to contribute to the advancement of the radio art.

(c) Encouragement and improvement of the amateur service through rules which provide for advancing skills in both the communication and technical phases of the art.

(d) Expansion of the existing reservoir within the amateur radio service of trained operators, technicians, and electronics experts.

(e) Continuation and extension of the amateur's unique ability to enhance international goodwill.

Applicability to Removal of Bandwidth Limitations
“Basis and Purpose” points (b), (c), and (d) are specifically applicable to the issue of bandwidth limits in the Amateur Radio VHF and UHF bands.

In (b), “advancement of the radio art” has now shifted into the realm of digital / data modes especially in the realm of Software Defined Radio.

In (c), “advancing skills in both the communication and technical phases of the art”, in this era, the most valuable skill in radio technology is moving radio technology from the hardware realm, where the function of a radio system is mostly defined by (fixed) hardware components, to the software realm where the function of a radio system is almost entirely defined by creative software.

In (d), “trained radio operators, technicians, and electronics experts” is now well underway with the recognition by technical experts (including those in higher level technical education) that Amateur Radio is a valuable asset in increasing their understanding and experience with radio technology.

In support of “advancement of the radio art”, advancing skills” and “trained radio operators, technicians, and electronics experts”, all of those require from Amateur Radio the ability to experiment with modern radio technologies, and in many cases such technologies are incompatible with the current bandwidth limits in Amateur Radio VHF / UHF bands such as 20 kHz (6 meter and 2 meter bands) and even 100 kHz (1.25 meter and 70 centimeter bands).

Example - New Packet Radio

A current example of the value of removing bandwidth limits from the Amateur Radio VHF / UHF bands is New Packet Radio - NPR (https://hackaday.io/project/164092-npr-new-packet-

radio) which debuted in 2019. NPR is an open source project designed by an Amateur Radio Operator for use in the 70 centimeter band. Outside the US, NPR systems can be operated at speeds of up to 1 Mbps (raw data rate). Within the US, the maximum data rate of NPR is restricted to 100 kbps. (Assuming the removal of baud rate limitations as the FCC has proposed.) The reason for this disparity, this disadvantage of US Amateur Radio Operators to contribute to "advancement of the radio art", "advancing skills…", and "trained operators" is the current bandwidth limit of 100 kHz in the 70 centimeter band. If there was no bandwidth limitation in the 70 centimeter band, not only could existing NPR systems and technology be widely deployed for fast data networks, but radio technology based on NPR could be further developed in the US. This is especially true given that all details of NPR - software, hardware, protocols, etc. are available as open source. In many ways, the US Amateur Radio service is an ideal place to conduct such experimentation and development and innovation, because most of the US enjoys the use of 30 MHz in the 70 centimeter band. In Europe, where NPR was developed, Amateur Radio Operators only have the use of 430-440 MHz… and yet with only 30% of the US 70 centimeter band, they are not restricted to the current US bandwidth limit of 100 kHz.

Example - Open Source LTE Technology

Another example of the value of removing bandwidth limits from from the Amateur Radio VHF / UHF bands is the emergence of open source implementations of Long Term Evolution (LTE) mobile wireless technology that could potentially be adapted for use in Amateur Radio spectrum. However, the most basic implementation of LTE requires a bandwidth of 1.4 MHz, and thus cannot, currently, be experimented with in US Amateur Radio VHF / UHF bands. The benefits of adapting LTE are potentially enormous - multiuser, interoperable digital voice, data transfer, messaging, location, etc. While Amateur Radio is a non-commercial service, the lessons learned and technology developed or adapted learned from implementation of LTE technology could potentially be applied to other services operating in the VHF / UHF bands.

Example - Analog Television Using 6 MHz Bandwidth in 70 centimeter Band

The use of analog (and digital) television transmissions are an example that there are unlikely to be deleterious effects of removing bandwidth limits from Amateur Radio VHF / UHF bands. For decades, Amateur Radio Operators have transmitted full motion, full color analog (and recently, digital) television transmissions that occupy 6 MHz bandwidth, in the 70 centimeter band (and higher bands). Because such transmissions are not classified as a data mode, the 100 kHz maximum bandwidth restriction has never applied. But television transmission has been in use for decades in the 70 centimeter band, and thus evidence that Amateur Radio Operators have the ability to "work things out amongst themselves" for use of wider bandwidths than 100 kHz.

Three Unique Aspects of the Amateur Radio Service

There are three unique aspects of the Amateur Radio Service (ARS), relative to other radio services, that have, in the past, been overlooked, that argue for reorienting the Amateur Radio Service for maximum experimentation such as removing bandwidth limits from the Amateur Radio VHF / UHF bands.

The first unique aspect of the ARS is that the Amateur Radio is that because of considerable

experimentation and widespread use of the Amateur Radio VHF / UHF bands, Amateur Radio has the ability to "prove out" new technologies that are often not considered "practical" to try to implement other radio services that use VHF / UHF spectrum (at least without allocating large blocks of VHF / UHF spectrum such as former television broadcast channels being repurposed for mobile wireless systems).

The second unique aspect of the ARS is that because Amateur Radio does operate in "small blocks of spectrum" (often referred to as "narrowband") such as 4 MHz (6 meter and 2 meter bands) and 1 MHz and 3 MHz (1.25 meter band), that limitation incentivizes Amateur Radio Operators to innovate and create technologies that can operate within those limited portions of spectrum. Imagine how much more innovation could occur if there was flexibility of no bandwidth limit to, perhaps, implement the minimal data rate mode of NPR (100 kbps requiring a 100 kHz bandwidth) in the 6 meter band?

The third unique aspect of the ARS is that it is a non-commercial radio service that is not dedicated to a specific use case. The Amateur Radio Service is flexible, adaptive, and to assign a single word to the intent of 97.1 - "experimental". The Amateur Radio Service is rife with experimentation, from the lowest possible frequencies, to the highest possible frequencies within the Amateur Radio allocations. The ARS has, and Amateur Radio Operators can, adapt to new technologies, systems, and operation modes… but only if they are allowed to do so by regulations that are flexible enough to accommodate new technologies, systems, and operational modes.

Radios Are Now Computers - With an Antenna

The emergence of cheap, abundant, powerful computing power and digital signal processing has utterly transformed radio technology. We would not have modern mobile wireless networks, whole house Wi-Fi, or Low Earth Orbit satellite Internet access without such technologies. In a very real sense, radios have become computers - with an antenna.

A similar transformation in technology has emerged in learning and using these new radio technologies through the use of GNU Radio (https://www.gnuradio.org/), which is essentially an operating system for experimentation with this new class of "computers - with an antenna" radios. Essentially, GNU Radio does the hard work of experimenting with modern radio technology - it interfaces at a low level with widely disparate radio hardware and presents a unified framework for software development. Thus it's much, much easier to experiment with radio technology via GNU Radio than it was in earlier eras when software had to "write directly to the hardware" of each and new radio device.

GNU Radio and Amateur Radio Spectrum to Test New Systems

But as useful and beneficial as GNU Radio is… there remains the issue of actually putting experimental radio technology developed with GNU Radio to actual use for experimentation in a system. While it's possible to build very low power networks within a laboratory or classroom environment… radio… is… different… when you actually try it out in the real world. Thus many radio developers are discovering the potential of obtaining and using an Amateur Radio license for experimentation and building experimental systems using Amateur Radio bands, especially VHF and UHF bands because they are easy to experiment with than microwave systems.

Through researching my newsletter, I have encountered many programs where students (university, Science Technology Engineering Math - STEM) are being encouraged to obtain their Amateur Radio licenses to facilitate experimentation. It is now a regular occurrence at some technology conferences such as DEF CON and GNU Radio Conference to hold Amateur Radio License Examinations as part of the conference, thus adding new Amateur Radio Operators who are by definition highly qualified to experiment and innovate with radio technology and systems.

Summary:

I recommend that the FCC allow the Amateur Radio Service to fully embrace future radio technologies by removing all baud (symbol) rates and bandwidth limits within the Amateur Radio VHF / UHF bands.

The Amateur Radio Service is an ideal environment for experimentation with new radio technologies by Amateur Radio Operators, especially now that radio technology has transitioned to "Computers - With an Antenna" and Software Defined Radio. However, increasingly such new radio technologies "don't fit" with current paradigms such as fixed bandwidth limits. Although it seems a bold step to remove all bandwidth limitations in the Amateur Radio VHF / UHF bands, the Amateur Radio Service has demonstrated its ability to self-regulate and "work it out amongst ourselves".

"No Bandwidth Limits" has been proven out by most other countries with Amateur Radio services, and there are no bandwidth limits on bands above 70 centimeters. Those two examples should provide reassurance that removing bandwidth limits will not result in chaos, or excessive interference as other commenters may predict.

Amateur Radio is still early in the transition to fully digital / data modes and Software Defined Radio, including the use of Cognitive Radio Techniques and use of Artificial Intelligence in opportunistically making full use of spectrum.

Simply… we Amateur Radio Operators don't know all of what's possible in future radio technology, but we're eager to experiment and innovate, and thus we request the FCC to "step boldly into the future of the Amateur Radio Service" by removing bandwidth limits in the Amateur Radio VHF / UHF bands.

In 1984, the FCC took a similar brave, forward looking step by allowing license-exempt operation in the Industrial Scientific Medical bands (the junk bands) with FCC 15.247, which ultimately resulted in the development of Wi-Fi, Bluetooth, and countless other innovations in radio technology. Amateur Radio Operators ask for a similar brave forward looking step by removing bandwidth limits in the Amateur Radio VHF / UHF bands.

Within hours of publishing this to the Zero Retries readership, I will submit the above comments via the FCC's Electronic Comment Filing System / Submit a Standard Filing which I'm choosing to use to upload a formatted document.

Also available is the FCC's Electronic Comment Filing System / Submit an Express Comment with is a simple "fill in the form" with no option for uploading a document.

*Again, the answer for the "*Proceeding(s): Specify the FCC proceeding(s) to which your filing refers" is:*

Docket 16-239

Again, Zero Retries readers - please comment in this proceeding. The deadline (as I understand it) for submitting comments is midnight Eastern on 2024-01-08. It's possible that we won't get another chance to influence the future of US Amateur Radio like this for a long time, and in my opinion we should seize this moment to ask for maximum flexibility for experimentation and innovation in our VHF / UHF bands by removing all bandwidth limits.

Update 2024-01-05:

My comments are now officially on record at the FCC.

In addition to early commenters Jeremy Taylor and Ron Economos, Josh Shupack, Tom Azlin (1) (2), Willis Keith Stroud, and Steve Lampereur have joined me in commenting on the NPRM. Kudos, folks!

No comments (on the NPRM) to date from: ARDC, AMSAT-US, ARRL, ORI, TAPR, etc. - organizations which could reasonably be expected to favor maximizing experimentation in the US Amateur Radio Service.

Leave a comment

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Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out
Join the Fun on Amateur Radio for some pointers.

Zero Retries Frequently Asked Questions (FAQs) — In development 2023-02.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with radio technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to everyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing ***Thanks*** to:

- Tina Stroh KD7WSF for, well, *everything!*

- ***Founding Members* who generously support Zero Retries financially:**
  Founding Member 0000 - Steven Davidson K3FZT
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- Numerous Annual and Monthly subscribers who also generously support Zero Retries financially!

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- The *most* effective way to support Zero Retries is to simply mention Zero Retries to your co-conspirators that are also interested in knowing more about technological innovation that is occurring in Amateur Radio and encourage them to become a fellow subscriber.

- One particularly effective method of promoting Zero Retries is to add a mention of Zero Retries to your QRZ page (or other web presence) and include a link:

  https://www.zeroretries.org

- If you'd like to financially support Zero Retries, becoming a paid subscriber is *greatly* appreciated and helps offset expenses incurred in publishing Zero Retries. Paid subscriptions for Zero Retries are *entirely optional*, as explained in this special issue of ZR:
  Zero Retries Administrivia - Activating Payment Options.

These blogs and newsletters regularly feature Zero Retries Interesting content:

- Dan Romanchik KB6NU mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.

- Jeff Davis KE9V also mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.

- Amateur Radio Weekly by Cale Mooth K4HCK is a weekly anthology of links to interesting Amateur Radio stories.

- Experimental Radio News by Bennet Z. Kobb AK4AV discusses (in detail) Experimental (Part 5) licenses issued by the US FCC. It's a *must-read-now* for me!

- RTL-SDR Blog - *Excellent* coverage of Software Defined Radio units.
- TAPR Packet Status Register has been published continuously since 1982.
- Other Substack Amateur Radio newsletters recommended by Zero Retries.

These YouTube channels regularly feature Zero Retries Interesting content:

- HB9BLA Wireless by Andreas Spiess HB9BLA
- KM6LYW Radio by Craig Lamparter KM6LYW (home of the DigiPi project)
- Modern Ham by Billy Penley KN4MKB
- Tech Minds by Matthew Miller M0DQW

Zero Retries is currently using the Substack email publishing platform to publish Zero Retries. It's particularly suitable for small newsletters as you can get started for no cost.

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Zero Retries (N8GNJ) is on Mastodon — n8gnj@mastodon.radio — just click:

Zero Retries / N8GNJ on Mastodon

Email issues of Zero Retries are "instrumented" by Substack to gather basic statistics about opens, clicking links, etc.

More bits from Steve Stroh N8GNJ:

- SuperPacket blog — *Discussing new generations of Amateur Radio Data Communications — beyond Packet Radio (a precursor to Zero Retries)*
- N8GNJ blog — *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs — Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)

These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham (The City of Subdued Excitement), Washington, USA, and linked to the Internet via **Starlink *Satellite* Internet Access**.

2024-01-04

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Blanket permission granted for TAPR to use any Steve Stroh content for the TAPR Packet Status Register (PSR) newsletter (I *owe* them from *way* back).

1

Looking at http://arrl.org/news as of mid-day on 2024-01-04, the most recent item is dated 2023-12-29 and no mention of ARRL comments on Docket 16-239.